Aspects of the development and on-farm evaluation of Siragcrop, a computer-based crop management system

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The CSIRO and NSW Department of Agriculture are collaborating in the SIRAGCROP project to develop a computer-based Decision Support System (DSS) for the management of irrigated crops. The system will aid users to increase economic returns and water use efficiency through quantitative advice on important decisions. A detailed description of the planned structure and user-interface of this information technology project has been produced (1). A prototype DSS is being developed for wheat, making use of simulation models, expert systems and other specialised software. It will include decision making in irrigation scheduling, fertilizer and soil management, choice of cultivar, and disease and weed control. Irrigation scheduling is also being developed for soybeans, maize and sunflowers. Crop growth stage has a pivotal position in the DSS. Automatic weather stations collecting up-to-date daily weather data in the region provide a key input.

Interactive crop management

Growers aiming at high yields need to be able to identify accurately crop development stages and be aware of important crop parameters associated with high yields. Crop monitoring is a key to improved crop husbandry regardless of computer-based systems, but its adoption in conjunction with SIRAGCROP gives it a whole new dimension. After logging into SIRAGCROP, each user first finds out what his crop should look like, and then can either confirm or update key events, such as plant density, ground cover and crop growth stage. This is to ensure the accuracy of the generated advice, as the "computer crop" and the real crop could diverge without these field checks, especially on the difficult fine-textured soils in the region, making advice worthless. The check and update is followed by prediction of future events and advice on management decisions.

On-farm validation

The irrigation scheduling component has been developed using these principles and has been tested on-farm during the 1985 and 1986 seasons. Farmers with computers were selected in the Murrumbidgee and Murray Valleys. A crop growth chart and a user's guide assisted the farmer in recognizing growth stages and measuring important crop parameters (2). The accuracy of irrigation scheduling was evaluated by monitoring soil moisture and crop growth during the season. The average yield for the 15 test paddocks in 1985 was 4.6 t/ha (range 3.5-6.3). Good agreement between simulated and measured soil water depletion was obtained for crops on both grey and red soils which had not been subjected to adverse soil conditions (3). However, poor results on these fine-textured soils were obtained when unfavourable soil factors dominated and restricted crop yields. Within paddock variation was high for the latter paddocks. This is clearly illustrated on colour pictures of each paddock which were generated with an airborne thermal-IR scanner.

On-farm testing of irrigation scheduling will continue during the 1987 season, together with the evaluation of the first version of nitrogen management. A video explaining the Decimal Code (4) for crop growth stages and other development aspects of wheat will be available for instruction.

1. Stapper, M. et al. 1986. Technical Report No. 3, CSIRO CIFR, Griffith

2. Stapper, M. and Murray, D. 1986. SIRAGCROP Technical Report No. 1, NSW Dept. of Agric. and CSIRO CIFR, Griffith NSW.

3. Stapper, M. et al. 1986. Proc. Irrigation '86 Symposium, Irr. Assoc. Aust. and D.D.I.A.E., Toowoomba Qld., pp. 137-153.

4. Zadoks, J.C. et al. 1974. Weed Research 14: 415-421.